

WHAT IS CLAIMED IS:

- 1 1. A method, comprising:
 - 2 generating topology information including information on local interfaces in a
 - 3 device and remote interfaces in at least one remote device that connect to the local
 - 4 interfaces identified in the topology information;
 - 5 for each connected remote interface, determining a device type of the one remote
 - 6 device including the remote interface; and
 - 7 for each local interface connecting to one remote interface in one remote device
 - 8 of a specified device type, initiating communication with the remote interface to access
 - 9 remote topology information from the remote device indicating devices attached directly
 - 10 and indirectly to the remote device.
- 1 2. The method of claim 1, further comprising:
 - 2 merging the topology information with the remote topology information.
- 1 3. The method of claim 1, wherein the specified device type comprises an
2 expander.
- 1 4. The method of claim 1, further comprising:
 - 2 receiving at the remote device a request for the remote topology information
 - 3 from the device;
 - 4 determining at the remote device whether the remote topology information is
 - 5 completed; and
 - 6 transmitting the remote topology information to the device in response to
 - 7 determining that the remote topology information is completed.
- 1 5. The method of claim 4, wherein the remote topology information is
2 completed if the remote topology information indicates information on devices to which
3 the remote device is directly and indirectly connected.

1 6. The method of claim 5, wherein the remote topology information is
2 completed in response to completing:
3 determining the device type of at least one additional device to which the remote
4 device connects;
5 receiving additional topology information from the at least one additional device
6 to which the remote device connects that is of the specified device type; and
7 merging the received additional topology information with the remote topology
8 information .

1 7. The method of claim 1, wherein the topology information and remote
2 topology information include information on downstream devices.

1 8. The method of claim 7, wherein one downstream device comprises an end
2 device or an expander providing a direct or indirect connection to further end devices that
3 may be connected to through the downstream expander.

1 9. The method of claim 1, wherein the topology information includes an
2 entry for devices to which the device including the completed topology information
3 connects directly or indirectly, wherein each entry indicates a first address and first
4 interface of a first device, a second address and second interface of a second device
5 connected directly to the first device, and a device type of the second device, wherein the
6 device including the topology information connects directly or indirectly to all first and
7 second devices identified in the topology information.

1 10. The method of claim 1, wherein the devices comprise SAS devices and
2 wherein the interfaces comprise SAS PHYs, and wherein each device in the topology has
3 a unique SAS address.

1 11. A system in communication with at least one remote device, wherein each
2 remote device includes at least one remote interface and remote topology information,
3 comprising:

4 at least one local interface;
5 circuitry capable of causing operations to be performed, the operations
6 comprising:
7 (i) generating topology information including information on local
8 interfaces and remote interfaces in at least one remote device that connect to the
9 local interfaces identified in the topology information;
10 (ii) for each connected remote interface, determining a device type of the
11 one remote device including the remote interface; and
12 (iii) for each local interface connecting to one remote interface in one
13 remote device of a specified device type, initiating communication with the
14 remote interface to access remote topology information from the remote device
15 indicating devices attached directly and indirectly to the remote device.

1 12. The system of claim 11, wherein the operations further comprise:
2 merging the topology information with the remote topology information.

1 13. The system of claim 11, wherein the specified device type comprises an
2 expander.

1 14. The system of claim 11, wherein the topology information and remote
2 topology information include information on downstream devices, wherein one
3 downstream device comprises an end device or an expander providing a direct or indirect
4 connection to further end devices that may be connected to through the downstream
5 expander.

1 15. The system of claim 11, wherein the topology information includes an
2 entry for devices to which the device including the completed topology information
3 connects directly or indirectly, wherein each entry indicates a first address and first
4 interface of a first device, a second address and second interface of a second device
5 connected directly to the first device, and a device type of the second device, wherein the

6 device including the topology information connects directly or indirectly to all first and
7 second devices identified in the topology information

1 16. A system in communication with at least one remote device and one
2 upstream device, wherein each remote device includes at least one remote interface and
3 remote topology information, comprising:

4 at least one local interface;

5 circuitry capable of causing operations to be performed, the operations
6 comprising:

7 (i) receiving a request for remote topology information from the upstream
8 device, wherein the remote topology information includes information on the at
9 least one local interface and remote devices in communication with the at least
10 one local interface;

11 (ii) determining whether the remote topology information is completed;
12 and

13 (iii) transmitting the remote topology information to the upstream device
14 in response to determining that the remote topology information is completed.

1 17. The system of claim 16, wherein the remote topology information is
2 completed if the remote topology information indicates information on downstream
3 devices to which the remote device is directly and indirectly connected.

1 18. The system of claim 16, wherein the remote topology information is
2 completed in response to the circuitry completing:

3 determining the device type of at least one additional connected remote device;

4 receiving additional topology information from the at least one additional
5 connected remote device that is of the specified device type; and

6 merging the received additional topology information with the remote topology
7 information .

1 19. A system in communication with at least one remote device, wherein each
2 remote device includes at least one remote interface and remote topology information,
3 comprising:

4 at least one local interface;

5 a motherboard;

6 circuitry integrated with the motherboard capable of causing operations to be
7 performed, the operations comprising:

8 (i) generating topology information including information on the at least
9 one local interface and remote interfaces in at least one remote device that
10 connect to the local interfaces identified in the topology information ;

11 (ii) for each connected remote interface, determining a device type of the
12 one remote device including the remote interface; and

13 (iii) for each local interface connecting to one remote interface in one
14 remote device of a specified device type, initiating communication with the
15 remote interface to access remote topology information from the remote device
16 indicating devices attached directly and indirectly to the remote device.

1 20. The system of claim 19, wherein the operations further comprise:
2 merging the topology information with the remote topology information.

1 21. The system of claim 20, wherein the specified device type comprises an
2 expander.

1 22. An article of manufacture in communication with at least one remote
2 device, each remote device having at least one interface, wherein the article of
3 manufacture is capable of causing operations to be performed, the operations comprising:

4 generating topology information including information on local interfaces and
5 remote interfaces in at least one remote device that connect to the local interfaces
6 identified in the topology information ;

7 for each connected remote interface, determining a device type of the one remote
8 device including the remote interface; and

9 for each local interface connecting to one remote interface in one remote device
10 of a specified device type, initiating communication with the remote interface to access
11 remote topology information from the remote device indicating devices attached directly
12 and indirectly to the remote device.

1 23. The article of manufacture of claim 22, wherein the operations further
2 comprise:

3 merging the topology information with the remote topology information.

1 24. The article of manufacture of claim 22, wherein the specified device type
2 comprises an expander.

1 25. The article of manufacture of claim 22, wherein the topology information
2 and remote topology information include information on downstream devices, wherein
3 one downstream device comprises an end device or an expander providing a direct or
4 indirect connection to further end devices that may be connected to through the
5 downstream expander.

1 26. The article of manufacture of claim 22, wherein the topology information
2 includes an entry for devices to which the device including the completed topology
3 information connects directly or indirectly, wherein each entry indicates a first address
4 and first interface of a first device, a second address and second interface of a second
5 device connected directly to the first device, and a device type of the second device,
6 wherein the device including the topology information connects directly or indirectly to
7 all first and second devices identified in the topology information.

1 27. An article of manufacture in communication with at least one remote
2 device and an upstream device, wherein each remote device includes at least one remote
3 interface and remote topology information, wherein the article of manufacture is capable
4 of causing operations to be performed, the operations comprising:

5 receiving a request for remote topology information from the upstream device,
6 wherein the remote topology information includes information on the at least one local
7 interface and remote devices in communication with the at least one local interface;
8 determining whether the remote topology information is completed; and
9 transmitting the remote topology information to the device in response to
10 determining that the remote topology information is completed.

1 28. The article of manufacture of claim 27, wherein the remote topology
2 information is completed if the remote topology information indicates information on
3 devices to which the remote device is directly and indirectly connected.

1 29. The article of manufacture of claim 27 wherein the remote topology
2 information is completed in response to completing:
3 determining the device type of at least one connected additional device;
4 receiving additional topology information from the at least one additional
5 connected device that is of the specified device type; and
6 merging the received additional topology information with the remote topology
7 information .